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This publication contains information regarding new developments of interest to agriculture based on laboratory and field investigations by the Du Pont Company. It also contains published reports of investigators at agricultural experiment stations and other institutions as related to the Company's products and other subjects of agricultural interest.

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AGRICULTURAL NEWS LETTER

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THE AGRICULTURAL NEWS LETTER serves as a medium of reporting new developments and ideas in agriculture, particularly those related to advancements through research. Material herein may be reprinted, in whole or in part, in the interest of advancing the general knowledge of new agricultural practices.

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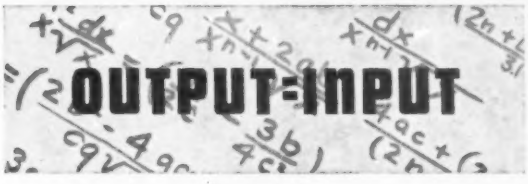
OTTO J. DEKOM.....*Editor*



"While farmers in the richer countries are better off than farmers in the poorer countries, their relative incomes are determined by a number of factors, of which the most important is *the level of output per person engaged in agriculture.* For example, a ton of wheat can be produced in North America with considerably fewer hours of work than are needed in Europe, and in a mere fraction of the time taken in less developed countries."

This is the conclusion reached in a recently published study of agricultural levels of living made by the International Food and Agricultural Organization.

That such a conclusion should be reached is not surprising. It is self-evident that living standards depend on the output of the economy. And that output, in turn, depends on productivity. As every farmer knows from his own experience, the higher the output per unit of resources used—including labor—the more of a contribution is made to the standard of living. To put it simply: OUTPUT equals INPUT. It is, indeed, fitting that the FAO should cite American experience as the standard of comparison for other nations, since our economy has achieved the highest level of agricultural and industrial productivity in history.

Obvious as the facts may seem, it is surprising that they are so often ignored in economic discussions that have a fundamental effect on the nation. For example, many of the wage discussions highlighted in recent months completely ignored the relationship of wages to productivity. Extravagant wage demands are advanced with the bland assertion that they can be put into effect without a compensatory adjustment in either productivity or prices.*

The extent to which basic economic facts have been ignored is reflected in the inflation of the postwar period. The rapid rise in pay scales during the period has far exceeded the rate at which new tools could be employed to raise productivity. Thus, the additional wage costs of necessity found their way into the price of goods and services.

The best example of this trend is in the pattern of industrial wages. The average hourly earnings in manufacturing are now close to 70 per cent higher than the level of the 1947-49 period. This means that wage rates have risen at a rate of better than five per cent annually, compounded. Productivity, on the other hand, has risen at a rate of between two and three per cent, depending upon the measure used. Since wages can only come from the money received out of the sale of goods, the difference inevitably is translated into higher prices.

* *A striking example is reported in* The New York Times *of October 28, 1959, page 1. The Transport Workers Union demanded a wage "package" which would admittedly have amounted to an additional $100 million annually for some 36,000 employees of New York's public transportation system. Yet the union asserted that such an increase — amounting to nearly 30 per cent of all present costs — could be granted without increasing fares, even though the city's transit system was already operating in the red!*

IN THIS ISSUE

Soviet Russia's space vehicles have left the impression in many an American mind that U.S. technology has been outstripped across the board. Although the hysteria of the first Sputnik days has passed, many still feel that American technology has not been able to compete with the regimented organism of the Soviet Union.

The capacity of a nation to create cannot be measured by a single branch of technology. The measure of progress is complex; it must encompass the total picture. The fact is that total U.S. productive capacity, based on advanced U.S. technology, is still so far ahead of the Russian that our level of output is still the official Soviet goal for the future. Nowhere is this more evident than in agriculture. Soviet leaders—including Khrushchev during his recent visit—make it their proudest boast that someday they will be able to equal the output of America's farms.

43 Per Cent in Agriculture

Despite the efforts made to advance Soviet agriculture to modern standards, it still takes 43 per cent of the labor force in farming and forestry, compared to but 12 per cent in the U.S. Thus, 50 million Russians are committed to agriculture—several times the U.S. total—yet our output exceeds theirs by a wide margin.* This, of course, accounts for the low average living standard of the average Soviet citizen. It takes 7.3 times as many man hours to produce wheat on a Soviet collective farm as the U.S. average, 5.1 times the man hours to grow potatoes, 6.2 times for sugar beets, and 3.1 times for milk.† This situation makes the most essential of all commodities, food, highly expensive in economic terms, as evidenced by the cost of farm products to the average Russian worker.

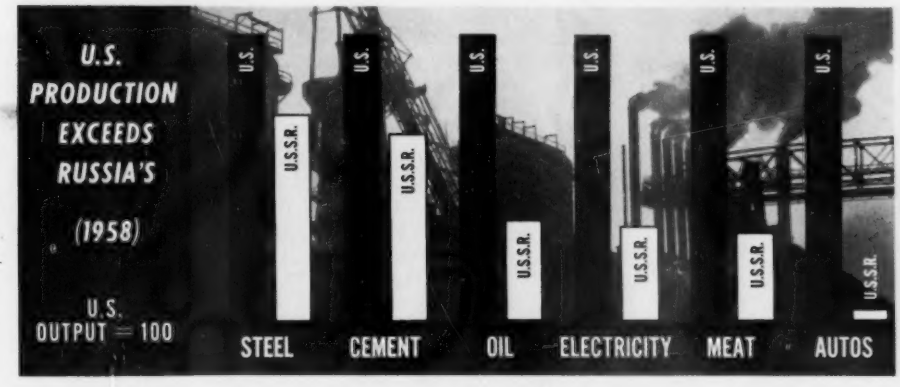
Of equal importance is the excessive labor need of agriculture, which is largely responsible for Russia's chronic shortage of workers in industry. Production goals lag behind because enough workers cannot be drawn from agriculture—without the flow of farm goods other sectors of the economy cannot operate. In the U.S., on the other hand, the major part of the work force is available for nonfarm production, both peacetime and defense.

Direct growth comparisons are difficult, even impossible, because Russian statistics are published for propaganda, not as guidelines to the economy. But it seems evident that Khrushchev's claim of total productive equality by 1970 is about as valid as Soviet claims to invention of McCormick's reaper. In testimony before the Joint Economic Committee of the Congress, it has been estimated that Soviet output would approach only 50 per cent of ours by 1970.

Mathematically, the situation comes to this: Soviet output is now about 40 per cent of ours. If Russia's gross national product rises at a rate of one percentage point over our steady three per cent growth rate, it will take over 90 years for them to catch us. If the rate is two points above ours, it will take about 30 years. And, even if their growth rate is twice ours, it will still be almost a quarter of a century before the Soviets can match U.S. production.

* *Benson, Ezra Taft: Address before the National Mechanical Corn Picking Contest, October 16, 1959.*

† *Volin, Lazar: "Soviet Agriculture Under Khrushchev", Foreign Agricultural Service, U.S.D.A.*



U.S. PRODUCTION lead over Soviet Union continues strong despite major Russian effort to close the gap. USSR has concentrated capital and labor in heavy industry, at the expense of consumer goods. U.S. growth, on the other hand, has produced both.

the cause and prevention of HEATING in FEEDS

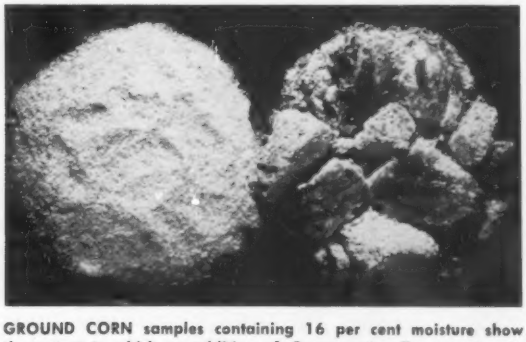
By L. R. RICHARDSON*
Department of Biochemistry and Nutrition
Texas Agricultural Experiment Station

Spontaneous heating in grains, feed ingredients, mixed feeds, and other agricultural products which may occur within the stored bulk, has been a problem for 40 years. It was believed that respiration of the seed, particularly embryo, was responsible for the increase in temperature, but most investigators agree now that mold is the primary cause. Normally, bacteria are not involved because the moisture in most feeds is not enough to support their growth. Molds primarily responsible grow at interspace relative humidities above 74 to 75 per cent, corresponding to moisture content of 13 to 15 per cent for most feeds.

It has been estimated that one per cent of the world grain supply is lost from growth of molds. No estimate of the damage to feed is available, but the experience of a Texas feed manufacturer illustrates the losses: 5,000 bags of feed which had heated in the warehouses of distributors were returned. Similar reports have come from other areas.

Spontaneous heating in soybeans containing 22.8 per cent moisture, during a test period of 19 days, produced a marked increase in nonprotein nitrogen and in reducing sugars expressed as glucose, and a decrease in the petroleum ether-soluble fraction. Invariably, the growth of molds and heating is accompanied by an increase in fat acidity.

Several years ago, Texas manufacturers reported large losses in mixed feeds, especially those containing molasses. In 1950, an investigation was begun at the Texas Station to find methods for preventing spoilage. The critical moisture level of an ingredient is that which is in equilibrium at about 75 per cent relative humidity of air in the inter-particle spaces. The critical levels of 32 feed ingredients have been determined when stored for six weeks in a Dewar flask in a cabinet at 90° F. and 70 per cent relative humidity. It ranged from 8.7 per cent for one sample of bonemeal to 17.0 per cent for sorghum distillers dried grains. It is about 13.0 to 14.0 per cent for most seeds.



GROUND CORN samples containing 16 per cent moisture show the extent to which an addition of .3 per cent sodium propionate (to the sample on the left) inhibits heating in feed ingredients.

Molds cannot grow without moisture and below the critical level no ingredient or mixed feed will mold or heat. In most cases, the difference between safe and unsafe moisture levels is small. In one test, ground corn with 12.3 per cent moisture did not heat, but at 13.3 per cent, it started to heat in 12 days, reaching a maximum of 108° F. in 19 days. At 15.8 per cent, it started to heat in three days and reached 117° in five days. Ground grains consistently heated more rapidly and higher than whole. Whole corn with 14.5 to 15.0 per cent moisture might be relatively safe, but heats rapidly after it is ground.

Heating in mixed feeds is more complex than in single ingredients and depends to a large extent on moisture in the most abundant ingredient. In some instances, a minor ingredient excessively high in moisture might be responsible.

The moisture content of a mixed feed may be misleading with regard to susceptibility to heating. For example, a feed containing 13.8 per cent moisture heated in 30 days. When 10 per cent of a feed grade animal fat replaced an equal amount of ground corn, the moisture decreased to 11.5 per cent, but the feed heated in the same time.

Since moisture content is not a reliable index, the inter-space relative humidities have been correlated with heating in a few feed ingredients and mixed feeds. Inter-space relative humidities were obtained at 50°, 70°, and 90° F. with a humidity-sensing element connected to an electric hygrometer. The results are in the accompanying table. No ingredient or mixed feed heated when the inter-space relative humidity was 72 per cent or less, but every ingredient heated at 74 per cent or above. Both temperature and available water are more favorable for growth of molds at 90° than at 70°. These data illustrate why a carload of feed may heat when shipped from a cool to a warm area.

Extensive research and experience have shown that grains are safe when moisture content is low enough. With present Federal standards (maximum of 15.5 per cent for No. 2 corn),

(Continued on page 5)

* *Summary of an article appearing in* Poultry Comment, *Vol. 16, No. 2, published by E. I. du Pont de Nemours & Company (Inc.).*

garden pest control made easy

A simple cross-reference system of accurately measuring and spraying any one of 20 Du Pont garden chemicals has been developed for the 1960 gardening season, based on the Company's new three-nozzle hose sprayer. Du Pont research workers have found these garden chemicals fall into three spray rates. The three snap-in nozzles are calibrated to automatically deliver the appropriate amount of the chemical and the specified rate of spray. The labels of Du Pont's garden chemicals indicate which nozzle to use for proper application.

For example, in the case of "Lawn Weed Killer", which is used over larger areas, up to 10 gallons of lawn weed spray can be made with one filling, using the 10-gallon nozzle. The combination wettable powder materials, such as Du Pont "Rose Insecticide and Fungicide", are marked for the two-gallon nozzle. The material is measured into the shatterproof jar, and water is added to the two-gallon calibration mark on the jar. With sprayer, nozzle, and hose hooked up, there is nothing more to do but turn on the water. Between these two ranges are products which can be applied in quantities up to five gallons in one filling, so the packages are marked for the five-gallon nozzle.

Monthly special sales offers are being scheduled. There will be a discount on the sprayer when bought together with one of the featured products. In April, for example, Du Pont "Fruit Tree Spray", 72 per cent chlordane, and "Aphid and Mite Spray" will be featured. In May, the selected products will be "Garden Insecticide" (a methoxychlor-malathion liquid combination), "Fruit Tree Spray", and "Chickweed Killer". In June, emphasis will shift to "Lawn Weed Killer", based on 2,4-D, "Rose Insecticide and Fungicide", and the "Combination Garden Spray" containing "Parzate" zineb fungicide and methoxychlor insecticide. "Manzate" maneb fungicide for roses and tomatoes will be the featured product in June, along with "Crabgrass Killer" and "Vegetable Garden Dust".

The 1960 edition of the popular Du Pont Garden Clinic Guide, colorful 12-page garden chemicals reference manual, will be available in all stores selling Du Pont garden chemicals, or from: Editor, Agricultural News Letter, Du Pont Co., Wilmington 98, Del.

HEATING IN FEEDS (Cont.)

it is practically impossible to manufacture a mixed feed containing 2.5 to 5.0 per cent of an ingredient which has moisture of 45 to 50 per cent that is safe. Moisture would have to be close to 11 per cent for such a feed to be entirely safe from heating, and it is unlikely that the major ingredients will be this low.

Propionates are used as fungistatic agents in some human foods. Our experience with a variety of ingredients and mixed feeds to which a salt of propionic acid was added, shows that it will prevent molds and heating. Addition of 0.3 per cent of sodium or calcium propionate inhibited heating in every ingredient and mixed feed stored at 90° F. and 70 per cent relative humidity for 6 weeks, when moisture content was 16.0 per cent.

Short chain fatty acids (butyric, valeric and caproic) inhibited or delayed heating when they were added to ground corn at a level of 0.1 to 0.2 per cent, but these compounds would not be practical to use as heat inhibitors in commercial feeds. The use of propionates is indicated and would be practical when the feed is likely to be higher in moisture than normal, or when the storage temperature is above 85° F.

TABLE—Interspace Relative Humidity at Different Temperatures.

Ingredient	Moisture	50° F.	70° F.	90° F.
		Relatively Humidity		
	%	%	%	%
Ground Corn	14.5	61.5	67.3	77.2
Ground Milo	14.6	60.4	68.5	76.7
Soybean Oil Meal	14.4	65.9	69.5	74.2
Cottonseed Meal	14.2	66.0	70.9	77.4
Milo Gluten Meal	14.5	69.2	74.9	81.5
Dehydrated Alfalfa Leaf Meal	14.6	62.9	67.9	74.3
Steamed Bonemeal	8.4	59.5	68.4	77.0

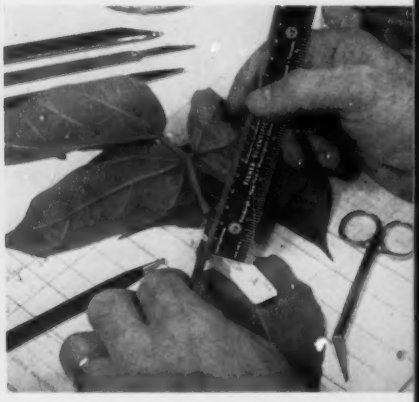
NEW, FREE BOOKLET ON WOOD STAINING OFFERED

"How To Finish With Wood Stains"—an illustrated, 12-page booklet—is available free from Du Pont. This "how to" brochure shows clearly the four basic steps: Removal of old finish, preparation for refinishing, using stains to obtain the exact color desired, and application of the top-coat. Materials described include recent developments which go far toward elimination of messiness, uncertainty of results, and the "long wait" before completion. Address requests to: Editor, Agricultural News Letter, Du Pont Company, Wilmington 98, Del.

WHAT MA

Some of the most unyielding secrets sought by today's scientists are not out in the endless reaches of spectacular space exploration but in the more prosaic life cycles of the common plants grown by man. Among the questions that remain unanswered are: How is the sun's energy utilized in plant growth? Why do some plants need more shade, sun, or longer seasons than others? How do certain chemicals fit into the life cycle of plants?

To answer these and other fundamental questions, Du Pont has



STEM LENGTH, especially the distance betwe nodes, is an accurate indication of a plan growth characteristics and is directly affected the environmental changes occurring during grow

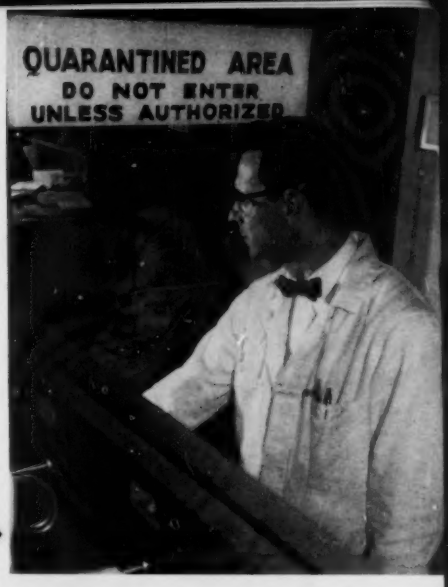
SPARKLING DROP of nutrient solution, containing experimental ingredients, is fed to bean plant at the Du Pont Company's Experimental Station near Wilmington, Del. Extensive checks and analyses are made to provide information on the effect of nutrition and of environment on plant growth.

ARTIFICIAL SUNLIGHT is controlled by a battery of instruments and time clocks. Alarm sounds in case of light failure. Light is generated by mixture of fluorescent and incandescent lamps generating double the intensity needed for photosynthesis.

KES PLANTS GROW?

invested heavily in time, money, and unusual research equipment. Much of the work is carried on by scientists at the company's sprawling $60-million Experimental Station. Here, under direction of the Central Research Department, the company invests most of its annual expenditure of $16 million for fundamental research in many fields of science.

The plant studies center around a group of special growth rooms, based on the work of Dr. Frits Went at the California Institute of Technology. In these laboratories, everything known to affect plant growth is strictly controlled and analyzed. Light, temperature, humidity and nutrients are changed at will. Night becomes day and summer is shifted to winter in an effort to probe the secrets of the chemical processes that control the growth of plants which man needs for his food and raw materials.



NEAR-STERILE conditions are maintained in plant-growth rooms to eliminate the possibility of introducing disease organisms or insects. Researchers wear lab coats, spray their shoes with insecticides.

LABORATORY-GROWN crop of string beans is "harvested" by Du Pont researchers. Samples are prepared for analysis and further study. Few laboratory plants are permitted to reach maturity.

NIGHT-AND-DAY experiment is carried out in the laboratory. Black cap over pruned cocklebur shuts out artificial sunlight generated by overhead fluorescent lights. Plant flowers after nine hours of darkness.

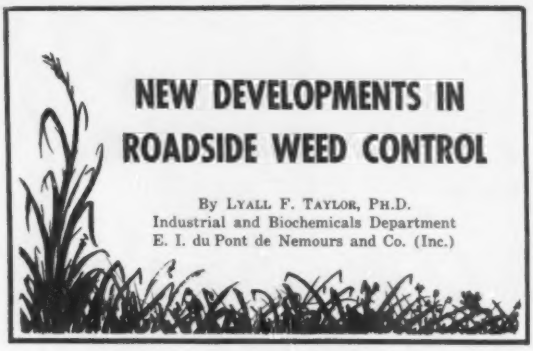
ROOT SYSTEM of experimental plant is examined as one test of effect of light, temperature, humidity, and nutrients on plant vigor.

Painstaking Care . . . Unusual Facilities

Du Pont's facilities for plant growth research are new, complete and unsurpassed and call for painstaking care and precautions. The pots are metal, sterilized and lacquer-lined. The "soil" is sterilized silica sand. The food is a special nutrient piped to individual plants and fed through a hypodermic needle. The air is filtered through carbon. Insects, weeds and disease are unknown.

Du Pont agricultural research goes back many years and—through the agricultural chemicals developed and marketed by its Industrial and Biochemicals Department—it has made significant contributions to U.S. agriculture. The Du Pont plant growth studies are largely of a fundamental nature.

ARTIFICIAL SUNLIGHT illuminates technicians in the process of starting a new cycle of plant tests in specially-designed Du Pont laboratory growth rooms.



NEW DEVELOPMENTS IN ROADSIDE WEED CONTROL

By LYALL F. TAYLOR, PH.D.
Industrial and Biochemicals Department
E. I. du Pont de Nemours and Co. (Inc.)

In recent years, there has been a sharp increase in interest by county and state roadside maintenance people in chemicals for weed control, probably because of the high cost of hand labor for mechanical types of weed control, and because of the excellent array of recently developed herbicidal chemicals. There has been significant progress in all important phases of roadside weed control.

General Vegetation Control — The so-called soil-sterilant chemicals control all types of vegetation and are used where bare ground is desired, primarily under guard rails, around sign posts, along bridges, in drainage ditches, etc., where it is very difficult to mow or blade.

A new use for soil sterilants is treating of six- to 10-foot strips along roadsides as a replacement for mowing and blading. Many users report chemical treatment reduces road maintenance cost. This treatment is widely used in the western states where the weed problem is mostly annuals, and water erosion is not serious. Erosion from water is a lesser problem with organic chemicals than blading.

Where surface washing of the chemical or soil erosion is a problem, some users have applied soil sterilants under thin layers of tar or bitumen (0.4 gallons per square yard). This holds the soil and chemical, probably extending the life of the sterilant up to three years or more.

Organic Soil Sterilants

The first organic soil sterilants were "Telvar" monuron weed killer and "Karmex" diuron weed killer, introduced about seven years ago by Du Pont as wettable powders for spray application. Now widely used in highway maintenance, these compounds are non-corrosive, non-flammable, very low in toxicity to warm-blooded animals, and easy to use. They also have been combined with chlorates, borates, and other compounds into granules for dry application.

One significant new development is the combination of chemicals to take advantage of their difference in herbicidal properties and complementary action. For instance, "Karmex" at 10 to 20 pounds per acre has been combined with dalapon (10 to 30 pounds per acre) to obtain the added control of perennial grasses. The amine of 2,4-D at two to four pounds per acre has been combined with "Karmex" for added control of certain perennial broadleaved weeds. For faster and more complete knockdown of existing vegetation, these herbicides have been combined with "Karmex" or "Telvar": amitrol (two to eight pounds per acre), 40 per cent sodium chlorate (100 to 200 pounds per acre), aromatic weed oils (80 to 100 gallons per acre). In these combinations, the "Karmex" or "Telvar" is of particular value for long-lasting residual weed control. The best combinations vary, depending on such factors as type of vegetation and rainfall.

Where the roots of valuable trees or ornamentals may extend into treated areas, there is some hazard of serious injury from soil sterilants. Tests show that "Karmex" is considerably less likely to injure trees than "Telvar" at equal dosages. The hazard can be reduced by lowering the dosage of "Karmex" and combining with weed oils, or other herbicides.

Noxious Weeds — A new family of herbicides, the chlorobenzoic acids, became available in 1958, and have proven particularly effective for control of field bindweed (perennial morning glory or creeping jenny). They are also very effective for control of leafy spurge, Canada thistle, Russian knapweed, and certain other broadleaved perennials declared "noxious weeds" by local laws. Two chlorobenzoic acids are being marketed by Du Pont under the trademarks "Trysben" 200 weed killer and "Zobar" weed killer.

Turf — For weed control in turf, 2,4-D is the stand-by, but new chemicals show promise. Silvex (2,4,5-TP) appears useful for control of hard-to-kill weeds such as chickweed and bedstraw. Soil sterilant compounds such as "Karmex" show promise for crabgrass and other annual weeds in Bermuda grass at very low rates.

Ornamentals — Weed control around ornamentals is a particularly tough problem in highway maintenance, especially with the expanding use of perennials and the high cost of labor. Du Pont "Kloben" neburon weed killer and "Karmex" show promise for control of seedling weeds and grasses when applied at low dosages prior to weed emergence. "Kloben" is marketed for weeding certain ornamentals, while test work with "Karmex" continues.

Many other products are being widely evaluated for control of weeds in woody ornamentals. Because of the wide variation in types of ornamentals and soil and climatic variations, it will probably be desirable for many highway agencies to conduct their own program for evaluation of herbicides. Representatives of chemical companies are usually available to provide advice or assistance in making such evaluations.

DU PONT AWARDS 4-H BEEF PRIZES

The Du Pont Company, sponsor of the 1959 4-H beef awards program, provided 43 state winners with all-expense paid trips to the 38th National 4-H Club Congress in Chicago after Thanksgiving. Six national winners received, in addition, $400 scholarships from the company. The 4-H beef projects involve raising animals and participation in shows, sales, judging events, and demonstrations. Awards are made on the basis of over-all achievements, rather than raising of blue-ribbon animals alone. The beef awards program had an enrollment of about 136,000 boys and girls in 46 states.

National winners were honored at a dinner attended by fellow state winners, leading cattlemen, representatives of breed associations and the meat industry, and adult 4-H advisors. The principal speaker, Clark W. Davis, general manager of the Du Pont Industrial and Biochemicals Department, said that the 4-H program "helps make the best of our young people better." Expressing the company's "tremendous satisfaction out of the small part we are playing in your 4-H work," he pointed out that adults who think that "teenagers are a problem have forgotten what a problem we were when we were teenagers . . . This is a fine generation of which we should be very proud."

Mr. Davis announced that the Du Pont Company would continue sponsorship of the 4-H national beef awards for 1960. The Company will again provide medals for the winners in the county competitions, the trips to the Congress for state winners, and six scholarships for national winners.

The 1959 national award winners were Margaret Ann Burk, 19-year-old medical student from Vale, Oregon; Phillip Burns, 17, eight-year veteran of 4-H Club work from Pikeville, Tenn.; Johnny Hafner, 18, of Orlando, Okla., who helps his father operate a 600-acre farm; Ronald F. Morse, 21, of Steuben County, N.Y., who is a freshman at Williamsport Technical Institute; David Pyle, 19, of Bainbridge, Ohio, a Purdue sophomore; and Bill Waddle, 18-year-old veterinary student from Visalia, Calif.

PREPARING to attack a prime round of beef at the National 4-H Club Congress are the six national beef award winners for 1959, and Clark W. Davis, general manager of the Du Pont Company's Industrial and Biochemicals Department, awards sponsor.

JOHN W. COVERDALE of Iowa, President of the National Committee on Boys and Girls Club Work, presents to Clark W. Davis a citation honoring Du Pont Company's first year as a 4-H award donor at 38th National 4-H Club Congress in Chicago.

SCALE IN MAPLE-SIRUP EVAPORATORS

Sulfamic acid (the half amide of sulfuric acid), a chemical widely used for cleaning milk-processing equipment, can be used to remove sugar sand from most maple-sirup equipment. It is an odorless, white crystalline solid highly soluble in water. The crystals are easy to handle, with little risk of spilling or danger from volatile fumes. Despite strong acid characteristics, sulfamic acid is only slightly corrosive on most metals except zinc plating, especially if contact is brief. On tin (the metal coating of most evaporators), hydrochloric acid is about 25 times and sulfuric 80 times more corrosive. Some manufacturers of sulfamic-acid cleaners add "inhibitors" which greatly reduce its attack on metals. Because of its corrosive action on zinc plating, sulfamic acid is not recommended for galvanized iron.—USDA (Agriculture Information Bulletin 203).

new PRODUCTS AND APPLICATIONS

Useful in preparing agricultural picture displays is a thermoplastic mounting cement in an aerosol spray. It permanently bonds photographs to paper, wood, glass, leather, or metal without wrinkling or discoloring. The clear cement is sprayed lightly over the back of the print. In about 20 seconds, the coating is dry, and the print is placed on the mounting material in the usual way, covered with a sheet of clean paper. It is then heated in place with a dry mounting iron or press, at a temperature no higher than 220° F. Heat and pressure for five to 10 seconds will fuse the print permanently to the mount. A household iron can be used at low temperature.

* * * *

A new, powder-actuated, captive-piston type livestock stunner uses 22 caliber rim fire power loads in five graded load strengths. The variety of loads is calculated to assure effective results in the humane stunning of cattle, calves, hogs, and sheep. Features of the new stunner include compact design, convenient size and shape for most efficient handling, lever type trigger, sleeve style bolt, automatic extraction and ejection of fired power load case, and fully automatic retraction of penetrator rod. All weights of all animal species can be easily stunned from the pate or from the back of the head. Operation is virtually noiseless, recoil-less and entirely safe. (Manufactured by Remington Arms Co., Inc., Bridgeport, Conn.)

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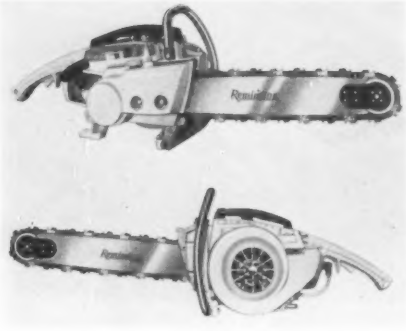

The "Bantam", a new, lightweight chain saw for all-purpose farm use, has a 17-pound engine, which is horizontally mounted and air cooled by a new high-velocity airstream system. It produces over one horsepower per five pounds of weight. "Flat" cylinder position gives a low center of gravity for handling convenience and better working control; overall height is just nine inches. Direct sprocket drive gives a chain speed of 3,800 feet per minute; the drive operates through an automatic clutch that keeps the chain safely at rest when idling. Guide bars are available, in lengths of 12, 18 or 24 inches. The chain is easily sharpened with a round file. (Made by Remington Arms Co., Inc., Bridgeport, Conn.)

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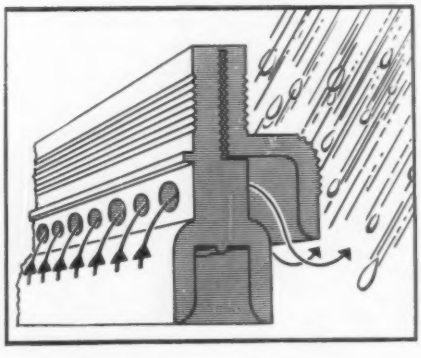

A ventilator for automobile and truck windows provides draftless air circulation in bad weather when windows are closed. The ventilator is made of long-lasting extruded neoprene strip, perforated with a series of ¼-inch holes. It functions on the principle that air passing over an aperture creates a partial vacuum over the opening. At 60 mph, this action exhausts three cubic feet per minute with all windows closed against rain, snow, or noise. The ventilator prevents windows from fogging or steaming, and the airflow effectively draws out cigarette smoke. (Manufactured by Mathews Ventilator Company, Youngstown, Ohio)

Leaky faucets, shower heads, or automatic washer hoses caused by loose, worn threads on connections can be repaired with a white plastic tape. A single wrapping around exposed threads before assembly increases their sealing power as do pipe dope compounds used by plumbers. The tape out-does older preparations by lessening friction so the joint can be drawn up tighter. It is made of a Du Pont "Teflon" TFE-fluorocarbon resin, a plastic as slippery as ice and unaffected by sunlight, moisture, concentrated solvents and acids, or water temperature from boiling to below freezing. The tape is also ideal for use on stud bolts, screws, and other household hardware.

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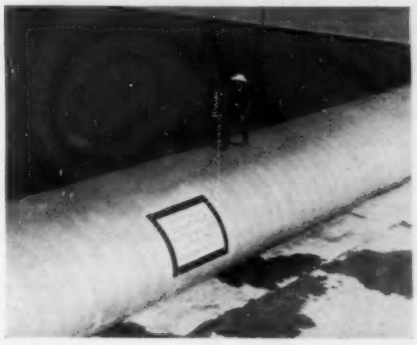
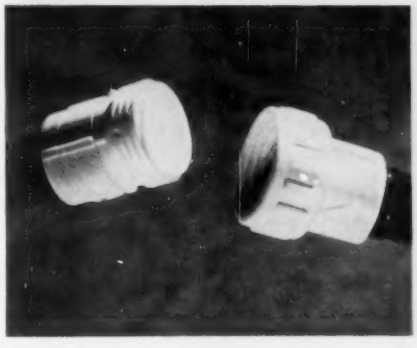


A flexible dam across the Los Angeles River, designed to collapse under flood conditions, should prove suitable for use in irrigation and flood control systems. It consists of a neoprene tube reinforced with nylon fabric. It can be inflated with water to any desired height. A siphoning arrangement empties the dam when river water flowing over it increases during flood stages, and the tube lies flat at the river bottom. The neoprene is tough enough to withstand the abrasion of water-borne sand and sufficiently flexible to collapse completely so that debris will not become tangled during flood periods.

* * * *

A 50 per cent increase in apple packing capacity since installation of a Lobee fruit-washing machine with "Tynex" nylon filament brushes is reported by the Salem Fruit Growers Cooperative Association, Greenford, Ohio. Processing volume has increased, because there are "no shutdowns for brush cleaning and waiting for apples to dry", according to the manager, H. D. Ross. "When there's a rush order for a load of apples, we're the only packer who can handle it regardless of weather conditions." One important feature, Ross reports, is that apples stay bright in the pack.

* * * *



A new nylon coupling, easily attached in one minute, makes it possible to make up random garden hose lengths. Normally garden hose is sold in precut lengths of 25, 50, 75, and 100 feet. Made of Du Pont "Zytel" nylon resin, the coupling has withstood tests under a variety of in-use conditions. Comparisons were made with brass coupling, and nylon out-performed the metal in every phase of the test. The nylon coupling is corrosion-free and self-lubricating, and in weathering tests it gave greater outdoor durability than the hose itself. The nylon reattachable coupling is available in diameters of $\frac{1}{2}$, $\frac{7}{16}$, and $\frac{5}{8}$ inch.

* * * *

The farm housewife will be interested in a 16-page buying guide designed to aid in the proper selection of carpeting. Copies of the guide, published by Du Pont's Textile Fibers Department, are available from more than 10,000 retailers who sell carpets qualified for the Du Pont label and manufactured with a pile of 100 per cent Du Pont carpet nylon. In the guide are discussions of colors and texture, how to tell quality, the merits of natural and man-made fibers, decorative ideas by textile designer Dorothy Liebes, the relationship between price and quality, and advice on carpet care.

NEW DEVELOPMENTS in WEED CONTROL

Many advances have been made in recent years in development of chemicals for weed control, in the formulation of herbicides, and in the techniques of their application. A number of these advances have been reported by the Du Pont Company at regional weed control conferences in recent months. Summaries of some of these reports are presented here.

PROGRESS REPORT ON BENZOIC ACID WEED KILLERS

The chlorobenzoic acids may kill weeds by being taken in through the foliage, or through the roots, or both. Probably because of this double killing action, these compounds early showed much promise for control of deep-rooted perennial broadleaved weeds, and especially vine-type weeds such as bindweed.

Field bindweed (morning-glory or creeping jenny) is a severe problem in much of the North Central area. Trichlorobenzoic acid has been widely used at rates of 10 to 20 pounds acid per acre (or polychlorobenzoic acid at 20 to 40 pounds) as a spot treatment. Control has been uniformly good with many cases of complete eradication. Best results are obtained when the spray is applied to actively growing foliage. However, some users report good control from applications in the winter when no green vegetation is present. Root absorption is important in the kill of bindweed, and a certain amount of moisture is required to carry the material into the ground. These products have also given satisfactory control of other important weeds, including Russian knapweed, leafy spurge, bur ragweed, and Canada thistle.

Control of woody vines, such as trumpet vine, honeysuckle, and smilax has been very good. Good control has been reported of some species hard to kill with other herbicides, such as wild roses, sumac, persimmon, sassafras, and conifers, including spruce, balsam fir, cedar and pine. Trials during the past two or three years have shown promising results on other species, including salt cedar, sagebrush, locust, and juniper. Continuing research indicates promise with these herbicides for a number of additional weed and brush control problems. *(Arden M. Aanestad before the Western Canadian and North Central Weed Control Conference, Winnipeg, Manitoba.)*

WEED AND BRUSH CONTROL WITH CHLOROBENZOIC ACID HERBICIDES

As is often true with pesticides, the applied phase of development proceeded more rapidly than development of more technical information. However, some of the more basic facts about their use are now recognized. Trichlorobenzoic acid is absorbed both by the roots and foliage. Root absorption appears most important since plants may be killed by soil treatment alone, whereas poor results sometimes accompany treatments applied primarily to the foliage. Foliar absorption has been reported where the herbicide was absorbed and translocated downward into plant roots and out into surrounding soil. It is of interest that nearby untreated bean plants absorbed trichlorobenzoic acid and translocated it upward into aerial portions of the plant.

Trichlorobenzoic acid has been shown to be only loosely absorbed by soil. Thus, this water-soluble chemical would be expected to move rapidly in the soil water, and performance of the herbicide should not be greatly affected by soil type. Tests have shown that 20 to 30 inches of irrigation water (or rainfall) will leach trichlorobenzoic acid deeply in the soil. On the other hand, when subject to low moisture conditions, it persists in the upper several feet of soil.

Field trials throughout the U.S. confirmed expectations that soil type is not the major factor influencing herbicidal performance. Moisture conditions appear more important and, in arid areas, best performance has been observed when treatment is made just prior to expected rainfall. *(Darrell C. Drake at the Southern Weed Conference, Biloxi, Miss.)*

CHLOROBENZOIC ACID WEED KILLERS

The chlorobenzoic acids are formulated as liquids to be diluted with water for spray application. On the basis of present information only ground sprayers are recommended for application. These products are not corrosive to spray equipment. Total spray volume needed per acre depends on the density and height of growth to be treated. For an average stand of morning-glory it appears necessary to apply a minimum volume of 40 gallons of spray solution per acre. Since water is at a premium in many areas, trials have been initiated with low volume applications. The first trial indicates that trichlorobenzoic acid undiluted at 10 gallons per acre was as effective as the same rate diluted and sprayed at 100 gallons per acre. The undiluted rate also gave satisfactory control when applied by air. Granular formulations of the chlorobenzoic acids have also been tested during the past year. Observations made one year after application indicate that these formulations give effective control of perennial broadleaved weeds when used at comparable acid equivalent rates. Such a dry material would facilitate small spot-type applications where it is impossible or not advantageous to use spray equipment. *(Robert H. Leavitt before the California Weed Conference, Sacramento, California.)*

PROGRESS REPORT ON "DYBAR" FENURON WEED AND BRUSH KILLER

Soon after the introduction of the substituted urea herbicides in 1952 for weed and grass control, it became apparent from the work of investigators that the more soluble compound, fenuron, was faster acting and more suitable for brush control than monuron. It was also evident that a dry pelleted formulation of fenuron was easier to apply and more effective than broadcast sprays. In 1957, this work led to the first registration of "Dybar" fenuron weed and brush killer pellets, containing 25 per cent of the active ingredients, for brush control.

Plant response to substituted ureas is dependent upon root absorption, and is usually not evident until three to six weeks after application, or after the plant reaches full leaf, depending on the time of year the material was applied and the amount of rainfall. As chlorosis and defoliation occur, the brush dies.

Susceptible species have usually been killed the year of treatment. Sometimes a plant may leaf out and defoliate several times before it eventually dies. Herbicidal effects on some species have been noted as long as 40 months after treatment, especially with low dosages. Terminal growth is usually greatly inhibited as soon as the first symptoms begin to show.

There is no volatility hazard from "Dybar" so it may be used adjacent to crop land, provided roots of desirable plants do not extend into the treated area. The effect on ground cover is limited to the area actually covered by the chemical, usually less than one square foot with spot application. With broadcast applications, knockdown of ground cover is usually limited to the small area where the individual pellet disintegrated. *(Florian J. Otto before the North Central Weed Control Conference, Winnipeg, Manitoba.)*

BRUSH CONTROL WITH SPOT APPLICATIONS OF FENURON IN THE NORTHEAST

Brush control with fenuron applied as a spot treatment was effective on all species of woody plants at rates as low as one teaspoon per cluster. Higher dosages of one tablespoon fenuron per brush cluster gave almost twice the kill at the end of the first year; however, at the end of four growing seasons, the difference in kill between the low and high rates was negligible. Fenuron may be applied as a spot treatment at any time of the year with comparable results. Low growing ground cover consisting of grasses, blueberries, bracken fern, and various weeds becomes re-established soon after treatment. The data indicate that re-treatment of rights-of-way with fenuron as spot treatment may not be necessary more often than every six or eight years. *(William I. Boyd before the Northeastern Weed Control Conference, New York, New York.)*

PLANT DISEASE FORECASTS AID PESTICIDE PLANNING

Availability of a number of plant-disease forecasts provides an important means for co-operation between the chemical industry and agriculture. Just as the farmer must study the forecasts made by the Department of Agriculture and State agencies to be prepared for application of control measures, so the producers of control chemicals must use the forecasts to see to it that pesticides are available in time.

The Du Pont company provides an example of the way in which the chemical industry operates to meet pesticide needs. Copies of federal and state disease forecasts are received by the Industrial and Biochemicals Department and routed to "product managers" — each of whom is a specialist in a particular field of plant diseases. An estimate is then made of the potential need for pesticides in the affected areas and plans made, in co-ordination with local Du Pont representatives, to promptly supply distributors with the product indicated.

The effectiveness of this "operation alert" is based on the known relationship between conditions of climate or weather and the incidence of various disease organisms. The USDA forecasting service is able to provide accurate predictions of the occurrence of late blight of potato and tomato, blue mold of tobacco, downy mildew of lima bean, and downy mildew of cucurbit crops. Additional as well as co-operative forecasts are provided by state groups and the USDA is planning to expand its service.

DU PONT PRICES DROP BELOW 1949 LEVEL

While the cost of living has climbed to record highs, the average sales price of Du Pont products is now below the level of 1949. There was a one per cent reduction during 1959. The price of Du Pont products, as that of the chemical industry in general, is important to the economy since fertilizers, pesticides, and chemicals are important production items in agriculture and in manufacturing.

The drop in the Du Pont price index was against the national trend and had some effect in slowing the general price rise even though Du Pont products generally do not reach the consumer in their original form, but enter importantly into virtually every industry.

Du Pont's ability to hold prices at moderate levels is due to two principal factors: increased manufacturing efficiency resulting from new technology and larger operating investment, and the benefits of increased volume.

FERTILIZATION STUDIES WITH CONTAINER-GROWN NURSERY STOCK

This study indicates that urea-formaldehyde added to the soil mix at planting time and one additional application at mid-season can adequately supply the first year nitrogen requirements of newly canned contained nursery stock. It also appears that potassium frit added to the soil mix will maintain a supply of potassium adequate for good growth. The seven species used in the experiment received all fertilizer from slow-release forms added to the soil when mixed and made as good or slightly better growth than plants fertilized at three-week intervals throughout the growing season. Terminal growth, total growth and number of laterals were essentially equal under all treatments. The results indicate that with the proper form and amount of nitrogen, phosphorus, and potassium added at planting time, container-grown stock needs little or no additional fertilizer during the first growing season—DEPARTMENT OF HORTICULTURE, UNIVERSITY OF KENTUCKY.

SEED TREATMENT CONTROLS HEAD SMUT OF PROSO MILLET

While proso millet is relatively free of diseases, yields may be reduced by smut, since infected plants and tillers fail to produce heads. Head smut is carried over from one season to the next as tiny black spores clinging to seed. The spores and seed germinate together, and the seedling becomes infected. For three years, fungicide seed treatments have been used in the field. Several will satisfactorily control the disease, but mercury fungicides are most effective. To insure a smut-free crop of millet the seed should be treated, preferably with an organic mercury compound such as "Ceresan"* seed disinfectant and planted when temperature and moisture are favorable for rapid germination and growth of the seedling.—AGRICULTURAL EXPERIMENT STATION, SOUTH DAKOTA STATE COLLEGE.

PLASTIC TUBING FOR MAPLE SAP

The maple sugar industry is being revolutionized through use of plastic tubing and central evaporator houses. A network of plastic tubing provides means of carrying sap from every tree to the central equipment. This eliminates the need for individual ownership of evaporating equipment and eliminates the old sap bucket.—U. S. DEPARTMENT OF AGRICULTURE.

* *Du Pont trademark*

NUTRITIONAL REQUIREMENTS OF HENS

Hens in cages produce better on a ration containing 18 per cent protein than those containing 15 per cent protein and are more efficient when fed rations containing 1,000 calories productive energy per pound. Rations containing 1,000 calories produce heavier eggs than those containing 800 calories.

A certain level of protein is needed in the diet for maximum growth or for maximum and economical production. A definite relationship exists between the protein and the energy of the diet. Whether it involves the influence of one on the utilization of the other or whether it is a question of feed intake is yet undecided. Generally speaking, when fat is added to the diet there is a reduction in feed intake. Therefore, if protein were not increased proportionately there would not be sufficient protein intake for maximum growth or production.—AGRICULTURAL EXPERIMENT STATION, LOUISIANA STATE UNIVERSITY.

TOMATO LEAF SPOT CONTROL

The four most destructive "leaf spot" diseases in Arkansas are early blight, bacterial spot, *Septoria* blight, and anthracnose. When the diseases do develop, protective fungicides must be applied to produce high-quality tomatoes. Recommended fungicides (zineb* and copper) will adequately control one or more but not all of the common leaf spot diseases; consequently, growers frequently cannot distinguish the various diseases, and selecting the proper fungicide becomes a matter of chance. Several diseases may be present in a single tomato field, and zineb or copper will be only partially effective. Work was initiated in 1957 to find a better over-all fungicide or combination of fungicides as safe as zineb which would effectively control more leaf spot diseases under Arkansas conditions. All chemicals tested, with the exception of maneb,* were inferior to zineb.* Maneb has not been injurious to tomato foliage and has effectively controlled early blight and *Septoria* blight. Other stations report that maneb is also effective against late blight and anthracnose. Zineb and copper will continue to be recommended for specific diseases, but accurate disease identification is necessary before either material can be used intelligently. Results with maneb, however, give promise of a superior wide-spectrum tomato fungicide. — UNIVERSITY OF ARKANSAS, AGRICULTURAL EXPERIMENT STATION.

* *Du Pont manufactures "Parzate" zineb fungicide and "Manzate" maneb fungicide.*

NITROGEN BOOSTS COTTON YIELDS

Nitrogen increased cotton yields in all but the extremely dry year of 1954 in three years of experiments on Sharkey clay soil at Marie, Ark. The studies involved rates to supply 0, 40, 80, 120, and 240 pounds of nitrogen per acre. The first 40 pounds of nitrogen increased yields by 350 pounds of seed cotton an acre, the next 40 pounds added 125 pounds, and the third 40-pound application gave an additional 100 pounds of cotton. Thus, 120 pounds of nitrogen boosted yields 575 pounds. Rates over 120 pounds did not appreciably increase yields. Use of the maximum or a lesser rate would depend on economic factors. The conventional method of application, in which nitrogen was applied in water furrows and bedded upon before planting, gave as satisfactory yields as applying all the nitrogen in the beds. Nitrogen increased the amount of cotton picked at the first picking, contributing to earliness of cotton grown on this soil.—AGRICULTURAL EXPERIMENT STATION, UNIVERSITY OF ARKANSAS.

CONTROL OF STRAWBERRY ROTS

Common harvest rots of strawberries are caused by "molds" that live in the soil. These "molds" generally affect the fruit, not other parts of the plant. For two years, plant pathologists have evaluated the effectiveness of various fungicide sprays in preventing or inhibiting botrytis rot, both in the field and storage. In every test, comparing treated with untreated plots of strawberries, "Thylate"* thiram fungicide proved to be a superior fungicide in preventing rot. Comparing field counts for an average of three pickings during the 1957 season, "Thylate" was 94 per cent effective in inhibiting rot. Results during the 1958 season were similar, indicating "Thylate" to be the most effective control for rot both during harvest and storage.—AGRICULTURAL EXPERIMENT STATION, PURDUE UNIVERSITY.

* *Du Pont trademark.*

HONEYDEW MELONS SUCCESSFULLY GROWN IN SOUTH CAROLINA

The first successful South Carolina commercial production of honeydew melons has taken place, representing a new breakthrough in plant disease work. Used in the breakthrough was a mixture of two organic fungicides—zineb* and maneb*—sprayed under pressure for about 15 applications during the growing season. Although prolonged late season wet weather cut melon production in half, evidence indicated disease control measures were effective to a degree exceeding expectations. This method is expected to be a boon to disease control for other melon varieties.—SOUTH CAROLINA AGRICULTURAL EXPERIMENT STATION.

* *Du Pont manufactures "Parzate" zineb fungicide and "Manzate" maneb fungicide. Only the former is registered for melons in South Carolina.*

MILK TEST FOR ROUTINE DETECTION OF KETOSIS

A positive milk test, which provides evidence of ketosis sufficiently early for adequate treatment, is sensitive enough for routine use with dairy herds. It substitutes for the older urine test, which sometimes gives "false reactors." The new test can be made by putting three drops of milk in the center of "Denco" powder consisting of sodium carbonate, ammonium sulfate, and sodium nitroprusside. Appearance of color indicates the presence of ketones in the milk, with faint pink as a mild reaction and purple coloration indicating necessity of treatment. The test would probably be used routinely only in herds with a history of ketosis. Weekly samples should be adequate to keep track of the disease.—UNIVERSITY OF WISCONSIN.

FERTILIZING GRAIN SORGHUM

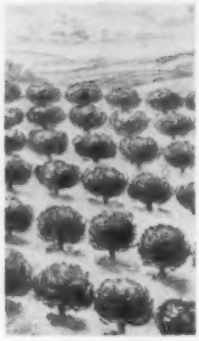
Because farmers will probably not plant grain sorghum on their most productive fields, a number of fertilizer experiments were located on low to medium fertility soils. The main objective was to determine response from nitrogen fertilization; however, some information on phosphate and potash fertilization was also sought. From this one-year study, it can be seen that approximately 60 pounds of nitrogen gave the best yields. Nitrogen fertilization was most effective on those soils that tested one per cent or less in organic matter.—AGRICULTURAL EXPERIMENT STATION, UNIVERSITY OF ARKANSAS.

SOIL TREATMENTS FOR WEED CONTROL IN SHADE TOBACCO PLANT BEDS

Weed control is a critical factor in production of shade tobacco seedlings. Control methods have progressed during the last 40 years from burning to steaming to chemical treatments. Sodium methyldithiocarbamate soil fumigant* is a liquid material which has given promising results for four seasons. It is used at the rate of 2¼ gallons per 100 square yards. The concentrated material is diluted with enough water to moisten the soil to a depth of four inches and applied as a drench.

Another satisfactory method is to sprinkle the diluted chemical on the soil, mix it immediately four to five inches deep with a rotary tiller, and irrigate to moisten the soil to the same depth. The method of injection is not recommended at present. Since this material has no appreciable fertilizer value, fertilization at the rate of two pounds per square yard is suggested. Top-dressing may be needed if pulling is delayed by cold, wet weather.—NORTH FLORIDA EXPERIMENT STATION.

* *Du Pont manufactures VPM Soil Fumigant containing sodium methyldithiocarbamate.*



CHEMICALS TO PROTECT ORCHARDS FROM WILDLIFE

One of the problems faced by orchardists in the winter months is damage from browsing deer or small wildlife, such as rabbits or meadow mice. Deer eat fruit spurs that would produce "profit fruit" —that which can be harvested without ladders — during the following year. Rabbits feed on the bark, severely damaging older trees and killing younger ones. The meadow mouse, a small and insignificant appearing animal, girdles fruit trees near ground level or at the snowline.

Successful tests in Massachusetts and Virginia have established that a high degree of protection against deer damage to fruit trees can be achieved through spray application of "Arasan" 42-S seed disinfectant and protectant to the twigs. Protection can be obtained for a relatively low cost. For example, these tests indicate proper chemical treatment for apple trees not yet bearing or producing their first crop would cost about $2.00 per acre.

Spray Data

In order to provide proper adherence to the trees under treatment, a sticking agent should be added to the chemical. A successful rate of application was two gallons of "Arasan" 42-S plus one gallon of Rhoplex AC-33 per 100 gallons of water. Trees were sprayed after leaf fall to the point of runoff. For young, nonbearing trees, it required about one quart of spray, with proportionately greater amounts needed for protection of larger ones. One coating was sufficient for the entire winter. However, until more data are available on these low rates, the registered use rate is one part "Arasan" 42-S to four parts water.

For protection against rabbits, the exposed area should be brush-coated with undiluted "Arasan" 42-S (to which two to four ounces of sticking agent is added per gallon of chemical), or sprayed with a solution consisting of one part each of chemical and sticking agent diluted in three parts water. The trunk should be thoroughly covered to well above the reach of animals.

Study Points to PURIFIED DIET FOR RUMINANTS

The possibility of developing a purified, roughage-free diet for ruminants is indicated in recent studies at North Carolina State College, partially financed with a grant from the Du Pont Company. Development of a purified diet for ruminants, similar to those already used for non-ruminant animals, would greatly simplify nutritional research and facilitate interpretation, since such diets contain known ingredients which can be reproduced.

The present experiments* are based on recent findings that practically all of the energy-yielding constituents of a normal hay diet are converted to volatile fatty acids, predominately acetic, propionic, and butyric. Of these, the propionates supply up to 85 per cent of the energy generated by ruminants. The energy produced by propionates is more productive than that of the acetate, which produces a real heat increment not usable by the animal organism. The present study was carried out with a series of experiments involving purified diets, with varying rates of acetates, propionates, and butyrates added. Since the diets were high in carbohydrate content, they were supplemented with the addition of 7.3 per cent sodium and 4.3 per cent potassium bicarbonate.

The results "indicate that bulk or roughage is not an essential in the diet of ruminants and that a purified diet devised for simple stomach animals is suitable for ruminants, providing that the diet is adequately supplemented with Na and K cations." Although the function of the latter is not definitely established, it is believed that an important role is associated with the buffering capacity in the rumen. With normal diets, the slowly-formed rumen acids are buffered by the mineral cations of circulating saliva. With a purified diet, the entire digestive process is greatly speeded and the flow of sodium-rich saliva is not adequate.

Studies with atomic tracers have given evidence that the dietary bicarbonates tend to shift ruminal production from the acetic to the propionic side. It is conceivable that "increasing the propionate might also increase the productive energy of the ration by decreasing the heat increment associated with acetic acid metabolism." It appears from the study, the researchers concluded, that "primarily grain diets will be feasible for ruminants."

* *Gennard Matrone, H. A. Ramsey, and G. H. Wise: "Role of Sodium and Potassium Cations in Volatile Fatty Acid Metabolism of Ruminants," Animal Nutrition Section, Department of Animal Industry, North Carolina College, Raleigh.*

"DO-IT-YOURSELF" CONSERVATION

200-ACRE FARM like Remington's near Chestertown, Md., can be handled by a man and a boy: Farm Foreman Ben Williams and neighbor Hugh Naylor, age 13.

PROBLEM: Unfenced field on sloping ground invites erosion, offers no natural source of food or protection to birds or game for more than six months out of the year. Mechanized farming strips land of natural cover needed by wildlife.

SOLUTION: A 1200-foot living hedge of multi-flora rose provides year-round wildlife cover. Remington's model farm has several miles of new hedges like this. Many states provide planting aid to farmers for similar conservation projects.

What can the typical farmer do to build up the capital value and productivity of his land through simple conservation practices?

Three years ago, Remington Arms Co., a Du Pont subsidiary, launched a conservation project that is beginning to turn up some answers to this question. Recognizing that the best game crops come from the best soils, Remington established a 200-acre model farm (equivalent in size to the average-size U.S. farm) on a newly acquired 3,000-acre game demonstration area. Pioneering studies to supplement government conservation programs have been undertaken with particular emphasis on practices to increase wildlife.

The work that is being done to promote good land use—especially on the edges of crop land, for wildlife is a product of the edges—demonstrated how a small amount of individual effort can create conditions under which birds and game will thrive. Some of the problems solved on this proving ground for conservation are demonstrated in these pictures as a "Do-It-Yourself" guide to conservation ideas for farmers.

PROBLEM: Eroded bank at roadside or farm lane entrance is not only unsightly but wastes U. S. land resources. Every year nation loses equivalent of 2500 average size farms through erosion. Edges of farm land provide food, shelter.

SOLUTION: Experimental planting of crown vetch, a hardy new plant in the United States, stabilizes soil. Plant's root structure spreads rapidly and holds on almost vertical slopes. This plant stays green throughout 10 months of the year.

PROBLEM: Ditch, created by causeway for new dirt road, threatens to develop into water raceway that will erode, undermine banks after heavy showers. Series of dams can help control a situation like this, and add valuable wildlife habitat.

SOLUTION: Impounded water does double duty by putting a stop to erosion, and helping support wildlife. Level of water is controlled by two-by-eight wood planks, enabling farmer to manage flooded area for desirable waterfowl.

urea fertilizer for IMPROVED CITRUS FRUIT QUALITY

Foliage sprays of urea fertilizer—long known as the most efficient means of providing nitrogen for citrus — have been shown in recent studies to bring about greatly improved fruit quality. Several years ago, California researchers found that urea fertilizer applied to the foliage of citrus was rapidly absorbed and utilized by the plant. In fact, foliage sprays were three times more efficient than equivalent soil applications.

More recent studies* have shown that properly-timed foliage fertilization also brings about a significant improvement in such quality factors as Vitamin C content, peel thickness, and fruit size. In the case of Valencia oranges, finding indicates improved control of "regreening".

It has been found, however, that urea used in citrus application must be low in biuret content. Excessive biuret causes chlorosis, commonly called "yellow tip", within two to eight weeks after spraying. Du Pont has compounded a special urea formulation for foliage feeding of citrus, "NuGreen" L-B fertilizer compound, with biuret content well below the safety level of 0.25 per cent established in experiment station research.

In California, applications of 5 to 7.5 pounds of the urea formulation per 100 gallons of spray have given best results. "NuGreen" is compatible with other products and may be applied in combination with pesticides, hormones, and minor element sprays. For Florida, where summer rains remove available nitrogen, eight to 12 pounds per 100 gallons is recommended.

Early-season fertilization is most effective, making a greater contribution to both yield and fruit quality. Nursery trees and non-bearing young trees can be efficiently supplied with nitrogen through foliage spraying.

Additional spraying in California may be made just before and during bloom to increase fruit set and after blooming to help prevent "June drop". "NuGreen" L-B may be added as needed whenever pesticide and minor element applications are made. In Florida, spraying is most effective three times during the year, again in combination with other sprays when desired. These are: Winter application in dormant sprays, post-bloom application in melanose or nutritional sprays, and summer applications in oil, zineb, or sulfur sprays.

* *W. W. Jones, T. W. Embleton, and M. L. Steinacker: "Nitrogen Fertilizers as Related to Orange Quality"*, The California Citrograph, *November, 1957, p. 3. Jones and Embleton: "The Visual Effects of Nitrogen on Fruit Quality of Valencia Oranges"*, Proceedings of the American Society for Horticultural Science, *Vol. 73, 1959.*

DU PONT MAKES IMPROVED RUMINANT FEED COMPOUND

An improved "Two-Sixty-Two" feed compound for use in ruminant feed formulations is being made by Du Pont's Industrial and Biochemicals Department. Offering greater efficiency and uniformity in commercial feed mixing, the new product is fully free-flowing and noncaking for use in either continuous or batch mixing operations. The natural tendencies of urea to cake in storage and segregate in feed mixtures have been overcome with new techniques for conditioning and sizing urea particles in manufacturing.

"Two-Sixty-Two", introduced in 1945, was the first large-volume commercial source of urea for formulation of ruminant rations. It provides a 42 per cent nitrogen source and its name derives from the fact that which is equivalent to 262 per cent crude protein. For those interested in a comprehensive report on urea as a protein source, an illustrated book, "Urea and Ruminant Nutrition" (80 pages, hard cover) provides an informative digest of recent research. It is available from: Du Pont Company, Industrial and Biochemicals Department, Wilmington 98, Del. at $2.50 a copy.

TAX STUDY, BOOK ON COMPETITION, AVAILABLE FREE

An illustrated study of the U.S. tax system, its development and effect on national growth, is available without cost from Du Pont. The 32-page booklet is suitable for class or group use, as well as individual reading. It points out that government at all levels now taxes approximately 25 per cent of the total output of the nation's farms, factories, and businesses. The principal hope for reducing this tax load is in increasing the efficiency of production so that national product will grow faster than tax needs.

For one or more copies of "The Story of Taxes," send requests to: Editor, Agricultural News Letter, Du Pont Company, Wilmington 98, Delaware.

Also available is a similar booklet entitled, "The Story of Competition in the American Market." This booklet shows how technology constantly expands the number and variety of products in the market. It shows how competition has increased parallel to the growth of industry, bringing to the American consumer the widest choice of products and services, and the most bountiful living standard in history.

Farmers Ask About . . . .

Q: What is the oil yield of a bushel of corn?
A. **Corn refiners average about 1.8 pounds of oil per bushel of corn.**

* * * * *

Q: How rapidly are bulk milk tanks being introduced?
A: **The number has increased about 10 fold since 1954, and it is estimated that the conversion will be largely completed by 1965, with a total of 275,000 in use.**

* * * * *

Q: Is the black widow the only poisonous U.S. spider?
A: **Although Latrodectus mactans is the most seriously poisonous spider in the country, there are four others in the continental U.S.: L. geometricus, L. bishopi, Loxosceles reclusa, and Chiracanthium inclusum.**

* * * * *

Q: How much effort does the Du Pont Company put into research?
A: **Research and development work by some 2,400 technically-trained people is going on at 100 laboratories, with the annual cost approximately $90 million.**

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Q: How is powdery mildew infection of wheat spread?
A: **The spores of the fungus** Erysiphe graminis tritici **are very light and are easily carried great distances by wind.**

* * * * *

Q: Is it true that ruminants do not need roughage to grow properly?
A: **A study with lambs at the North Carolina Station indicated that normal weight gain can be achieved with a roughage-free diet.**

* * * * *

Q: Can plastic pipe be substituted for steel in milk pipelines?
A: **Yes, it can. A University of Illinois study shows plastic works as well as steel pipeline.**

* * * * *

Q: What causes "stain" of lumber, and how can it be controlled?
A: **Two organisms classified as fungi attack newly felled and sawed lumber. Treatment with fungicides such as Du Pont "Lignasan" for blue stain or "Melsan" for blue stain and mold will prevent the infection.**

* * * * *

Q: Is it true that cellophane can be made in the kitchen sink?
A: **Yes, a kind of cellophane can be made at home, but the cost would be $50 a pound. To make the commercial product salable at 62 cents per pound takes a multi-million dollar investment in equipment.**

Q: Can brackish water be used for irrigation?
A: **Some vegetables will grow when brackish water with low salt content is used in small quantities, according to a USDA report.**

* * * * *

Q: How much of the hen's egg is fat?
A: **Nearly half of the dry egg weight, providing a major source of energy for the chick embryo or the human organism.**

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Q: What is happening to prices of Du Pont products?
A: **The sales price index of Du Pont products has recently dipped below the average for 1949 (see story on page 13).**

* * * * *

Q: How does rising temperature affect milk output of cows?
A: **According to a USDA study, production drops 10 per cent at 80° and 35 per cent at 95°.**

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Q: Can radioactive fallout be eliminated from farming land?
A: **Yes, by raking off straw mulch, removing sod, or scraping off the surface soil.**

* * * * *

Q: Is 12-month rotation of pens adequate to protect turkey poults from parasites?
A: **No, a USDA report says that parasite eggs remain in the soil for 4½ years.**

* * * * *

Q: What is going to be the next Du Pont "Show of the Month?"
A: **"Ethan Frome" will be presented on February 18, 1960, from 9:30 to 11:00 p.m. EST, over the CBS network.**

* * * * *

Q: How much of an investment does Du Pont have to make to create a new job?
A: **The average operating investment per employees is now over $30,000, and it runs to $100,000 or more in some newer plants.**

* * * * *

Q: What pests infest peanuts in storage?
A: **A variety of insects that usually infest stored farm products, including several species of grain and meal moths and many of the flour and grain beetles common in stored grains. The surface may also be affected by moth infestation.**

* * * * *

Q: What volume of farm products does Du Pont use?
A: **Over $40 million annually, including cotton, grains, sugar, and fats. The chemical industry buys more than $1 billion.**

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